



HD74UH04

Inverter

REJ03D0201-0400Z
(Previous ADE-205-016B (Z))
Rev.4.00
Feb.02.2004

Description

The HD74UH04 is high-speed CMOS inverter using silicon gate CMOS process. With CMOS low power dissipation, it provides high-speed equivalent to LS-TTL series. The internal circuit of three stages construction with buffer provides wide noise margin and stable output.

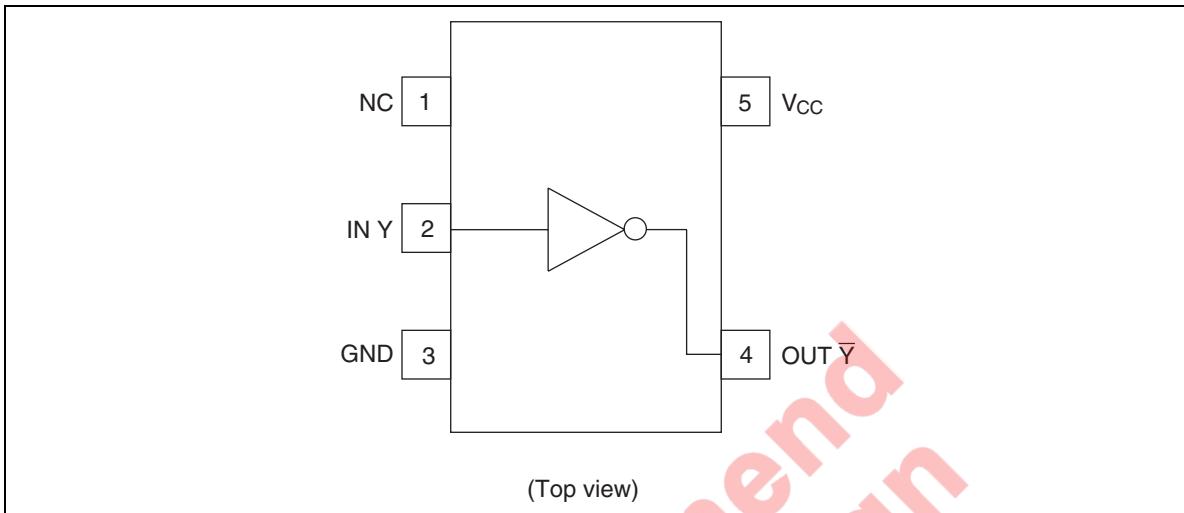
Features

- Encapsulated in very small 5pins package of $2.9 \times 1.6 \times 1.1$ mm, the efficiency to mount on substrate is significantly improved.
- The basic gate function is lined up as Renesas uni logic series.
- Supplied on emboss taping for high-speed automatic mounting.
- Electrical characteristics equivalent to the HD74HC04
Supply voltage range: 2 to 6 V
Operating temperature range: -40 to +85°C
- $|I_{OH}| = I_{OL} = 2$ mA (min)
- Ordering Information

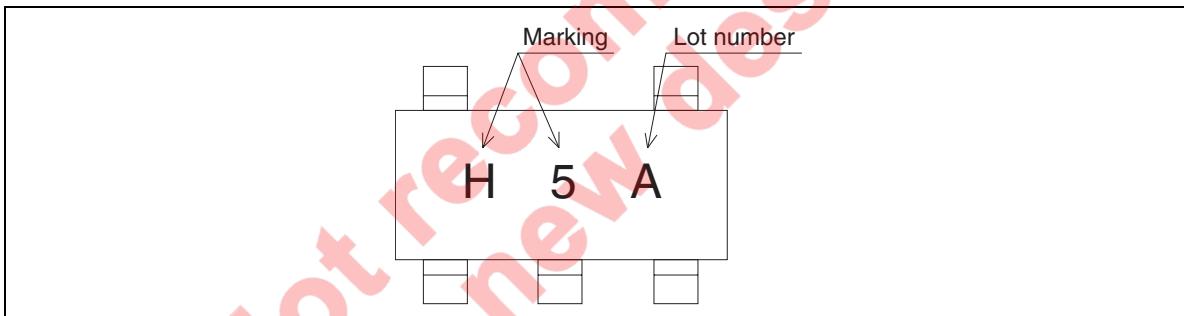
Part Name	Package Type	Package Code	Package Abbreviation	Taping Abbreviation (Quantity)
HD74UH04EL	MPAK-5 pin	MPAK-5V	-	EL (3,000 pcs/reel)

HD74UH04

Pin Arrangement



Article Indication



Absolute Maximum Ratings

Item	Symbol	Ratings	Unit
Supply voltage	V _{CC}	-0.5 to +7.0	V
Input voltage	V _{IN}	-0.5 to V _{CC} +0.5	V
Output voltage	V _{OUT}	-0.5 to V _{CC} +0.5	V
Input diode current	I _{IK}	±20	mA
Output diode current	I _{OK}	±20	mA
Output current	I _{OUT}	±25	mA
V _{CC} /GND current	I _{CC} , I _{GND}	±25	mA
Power dissipation	P _T	200	mW
Storage temperature	T _{STG}	-65 to +150	°C

Recommended Operating Conditions

Item	Symbol	Ratings	Unit
Supply voltage	V _{CC}	2 to 6	V
Input voltage	V _{IN}	0 to V _{CC}	V
Output voltage	V _{OUT}	0 to V _{CC}	V
Operating temperature	T _{OPR}	-40 to +85	°C
Input rise/fall time	t _r , t _f	0 to 1000 (V _{CC} = 2.0 V) 0 to 500 (V _{CC} = 4.5 V) 0 to 400 (V _{CC} = 6.0 V)	ns

Electrical Characteristics

Item	Symbol	V _{CC} (V)	Ta = 25°C			Ta = -40 to 85°C			Unit	Test Conditions
			Min	Typ	Max	Min	Max			
Input voltage	V _{IH}	2.0	1.5	—	—	1.5	—	—	V	
		4.5	3.15	—	—	3.15	—	—		
		6.0	4.2	—	—	4.2	—	—		
	V _{IL}	2.0	—	—	0.5	—	0.5	—	V	
		4.5	—	—	1.35	—	1.35	—		
		6.0	—	—	1.8	—	1.8	—		
Output voltage	V _{OH}	2.0	1.9	2.0	—	1.9	—	—	V	V _{IN} = V _{IL} I _{OH} = -20 μA
		4.5	4.4	4.5	—	4.4	—	—		
		6.0	5.9	6.0	—	5.9	—	—		
		4.5	4.18	4.31	—	4.31	—	—		I _{OH} = -2 mA
		6.0	5.68	5.80	—	5.63	—	—		I _{OH} = -2.6 mA
	V _{OL}	2.0	—	0.0	0.1	—	0.1	—	V	V _{IN} = V _{IH} I _{OL} = 20 μA
		4.5	—	0.0	0.1	—	0.1	—		
		6.0	—	0.0	0.1	—	0.1	—		
		4.5	—	0.17	0.26	—	0.33	—		I _{OL} = 2 mA
		6.0	—	0.18	0.26	—	0.33	—		I _{OL} = 2.6 mA
Input current	I _{IN}	6.0	—	—	±0.1	—	±1.0	μA	V _{IN} = V _{CC} or GND	
Operating current	I _{CC}	6.0	—	—	1.0	—	10.0		V _{IN} = V _{CC} or GND	

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Switching Characteristics

($C_L = 15 \text{ pF}$, $t_r = t_f = 6 \text{ ns}$, $V_{CC} = 5 \text{ V}$)

Item	Symbol	Ta = 25°C			Unit	Test Conditions
		Min	Typ	Max		
Output rise/fall time	t_{TLH}	—	5	10	ns	See Test circuit
	t_{THL}	—	—	—	—	
Propagation delay time	t_{PLH}	—	7	15	ns	See Test circuit
	t_{PHL}	—	—	—	—	

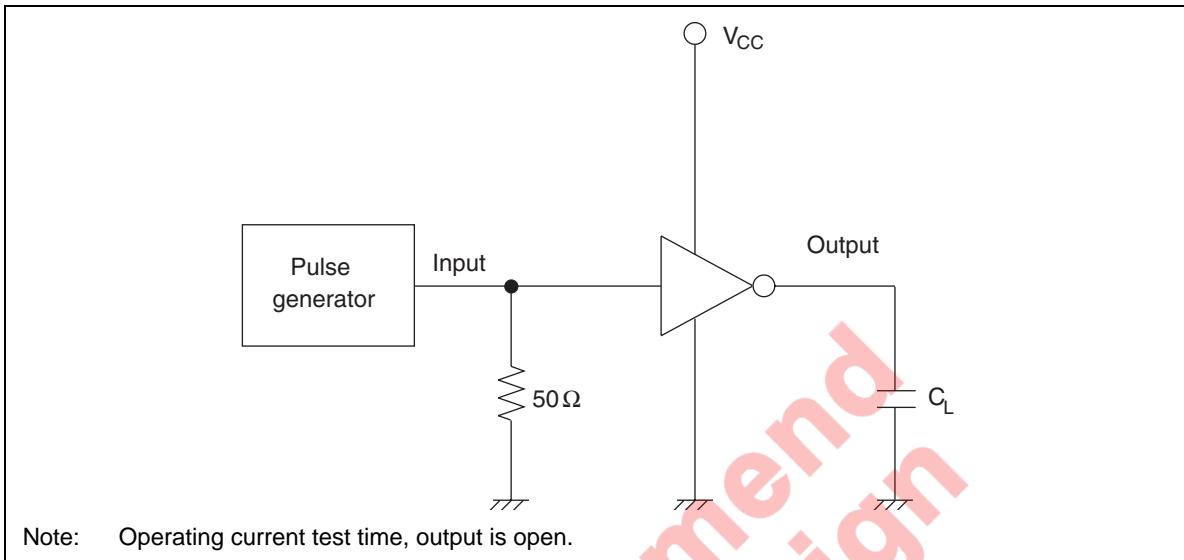
($C_L = 50 \text{ pF}$, $t_r = t_f = 6 \text{ ns}$)

Item	Symbol	V _{CC} (V)	Ta = 25°C			Ta = -40 to 85°C		Unit	Test Conditions
			Min	Typ	Max	Min	Max		
Output rise/fall time	t_{TLH}	2.0	—	50	125	—	155	ns	See Test circuit
	t_{THL}	4.5	—	14	25	—	31	—	
		6.0	—	12	21	—	26	—	
Propagation delay time	t_{PLH}	2.0	—	48	100	—	125	ns	See Test circuit
	t_{PHL}	4.5	—	12	20	—	25	—	
		6.0	—	9	17	—	21	—	
Input capacitance	C _{IN}	—	—	5	10	—	10	pF	
Equivalent capacitance	C _{PD}	—	—	10	—	—	—	—	

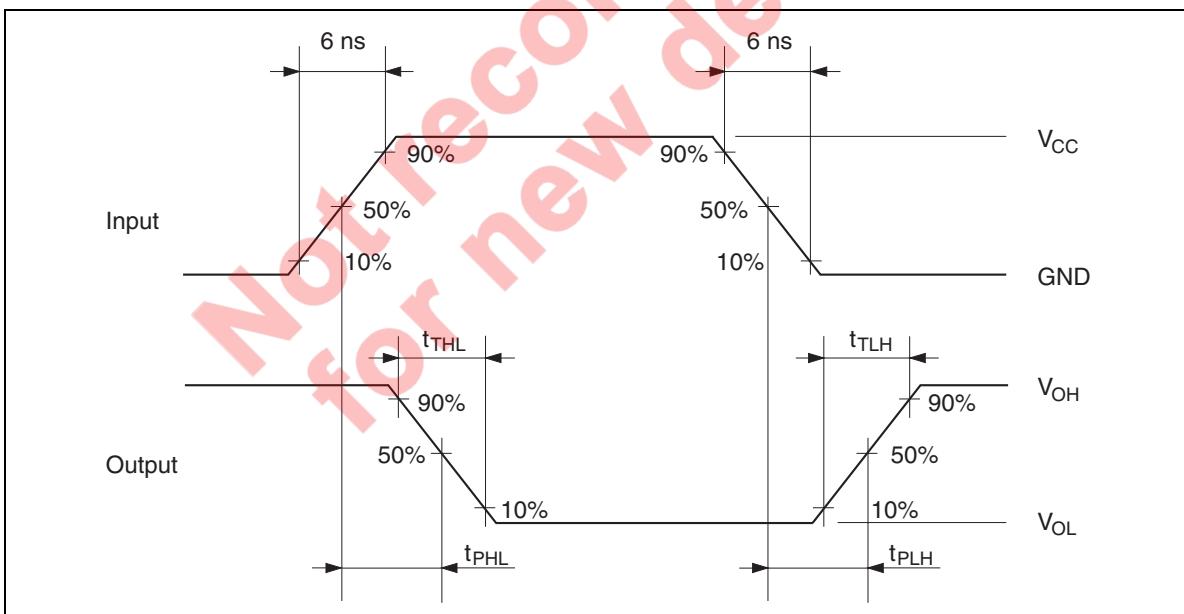
Note: C_{PD} is equivalent capacitance inside of the IC calculated from the operating current without load (see test circuit). The average operating current without load is calculated according to the expression below.

$$I_{CC(\text{opr})} = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC}$$

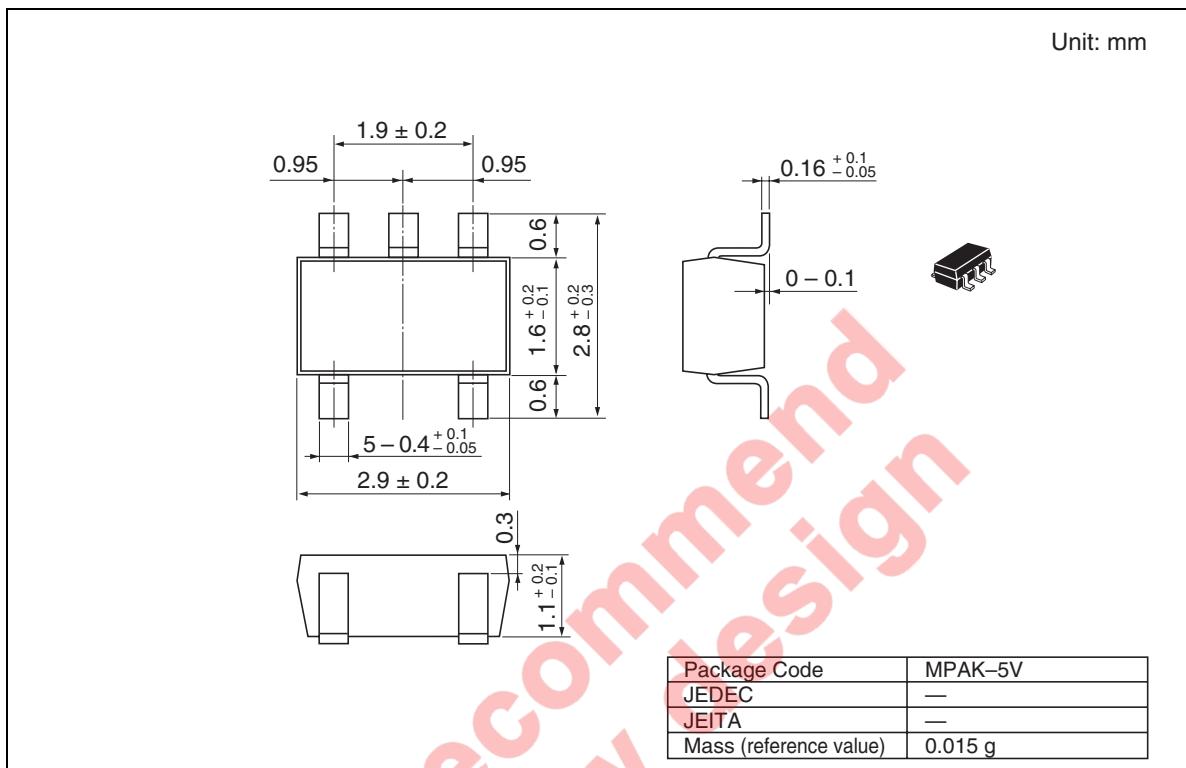
Test Circuit



Waveforms



Package Dimensions >



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Renesas Technology America, Inc.
450 Holger Way, San Jose, CA 95134-1368, U.S.A
Tel: <1> (408) 382-7500 Fax: <1> (408) 382-7501

Renesas Technology Europe Limited.
Dukes Meadow, Millboard Road, Bourne End, Buckinghamshire, SL8 5FH, United Kingdom
Tel: <44> (1628) 585 100, Fax: <44> (1628) 585 900

Renesas Technology Europe GmbH
Dornacher Str. 3, D-85622 Feldkirchen, Germany
Tel: <49> (89) 380 70 0, Fax: <49> (89) 929 30 11

Renesas Technology Hong Kong Ltd.
7/F., North Tower, World Finance Centre, Harbour City, Canton Road, Hong Kong
Tel: <852> 2265-6688, Fax: <852> 2375-6836

Renesas Technology Taiwan Co., Ltd.
FL 10, #99, Fu-Hsing N. Rd., Taipei, Taiwan
Tel: <886> (2) 2715-2888, Fax: <886> (2) 2713-2999

Renesas Technology (Shanghai) Co., Ltd.
26/F., Ruijin Building, No.205 Maoming Road (S), Shanghai 200020, China
Tel: <86> (21) 6472-1001, Fax: <86> (21) 6415-2952

Renesas Technology Singapore Pte. Ltd.
1, Harbour Front Avenue, #06-10, Keppel Bay Tower, Singapore 098632
Tel: <65> 6213-0200, Fax: <65> 6278-8001